- ➢ Goal: Test simple knobs to move collision waist (change α^*)
  - ▪ $\alpha(s=0)=\Delta/\beta^*$ where Δ is the waist change, $\beta(s=0)= \beta^* + \Delta^2/\beta^*$
  - ▪ Want to maximize dalpha/dQ in tables below (minimize dQ)
- ➢ Knobs for $\alpha(s=0)$ and $\beta(s=0)$ from MAD-X lattice calculations:
 - ▪ Common mode changes of quads on either side of blue IR8

```
              Responses to common mode +0.0001 dKL, scaled to per unit change
              dalpha_x(0) dalpha_y(0) dbeta_x(0) dbeta_y(0) dnx(0)    dQx         dQy
============== ========== ========== ========== ========= ======= ========= =========
bo7-qd1/bi8-qf1  -38.33915  -46.73513 -155.34933 -343.98184 -0.80437 158.53270 -158.73330
bo7-qf2/bi8-qd2 -496.63494 -543.13242 -206.39680 -466.40890 -7.75205 213.53290 -215.34770
bo7-qd3/bi8-qf3  519.57128  542.92061 -189.19959 -492.09268  8.06459 215.57530 -217.66660
bo7-qf4/bi8-qd4   10.61554    0.92603   -5.16994  -12.26218  0.95882   6.96930   -6.86370
bo7-qd5/bi8-qf5   40.53355   25.24712   11.96788  -35.44325  1.65747   9.69700   -9.47980
bo7-qf6/bi8-qd6   -0.49534    4.35237   20.26961  -26.10951 -0.05472   5.41700   -5.36820
bo7-qd7/bi8-qf7   -0.13624  -16.65844   17.73092  -13.57249 -0.15974   4.67610   -4.84000
============== ========== ========== ========== ========= ======= ========= =========
```

  - ▪ Difference mode changes of quads on either side of IR8

```
              Responses to difference mode +/-0.0001 dKL, scaled to per unit change
              dalpha_x(0) dalpha_y(0) dbeta_x(0) dbeta_y(0) dnx(0)    dQx       dQy
============== ========== ========== ========== ========= ======= ========= =========
bo7-qd1/bi8-qf1  -978.2662   996.4042    51.3333    69.3647 -16.7918   5.9073    5.8214
bo7-qf2/bi8-qd2 -1323.1873  1308.1443    38.9349   245.5510 -22.2506  77.7349   75.6486
bo7-qd3/bi8-qf3 -1323.1209  1378.1185   153.7274   -60.3993 -25.0413 -80.7399  -81.0486
bo7-qf4/bi8-qd4   -40.5120    41.3112    -9.6533   -13.4487  -0.5890  -1.1642   -1.1057
bo7-tq4/bi8-tq4   -41.9421    42.4114    -8.0838   -15.9391  -0.6403  -2.6192   -2.5448
bo7-qd5/bi8-qf5   -58.3733    42.1778   -12.5025   -28.4377  -2.0952  -6.8586   -6.6702
bo7-qf6/bi8-qd6   -17.4182    -2.4710     5.5536     5.5853  -0.5581   1.1392    1.1680
bo7-qd7/bi8-qf7     7.2567   -23.8920   -17.8322   -16.5465  -0.1554  -3.5459   -3.6359
============== ========== ========== ========== ========= ======= ========= =========
```
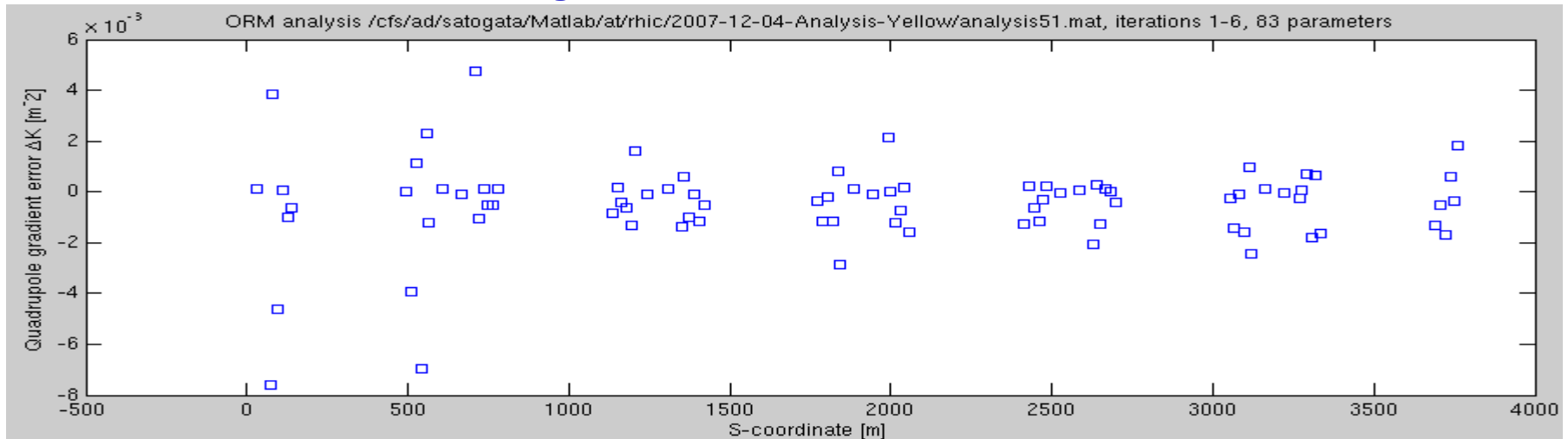
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- First attempt to move waist dumped the beam
  - Accidentally didn't correct tunes properly
  - Accidentally used common mode instead of difference mode
- Later attempts with fresh 6-bunch ramp
  - Could move tq4s in common/difference mode up to 6e-3 m^{-1}
  - Should move waist about 10-30 cm (common/difference mode)
  - Simply re-sent tune buffer values to compensate tunes
  - No apparent changes in rates: PHENIX rates during IR8 scan

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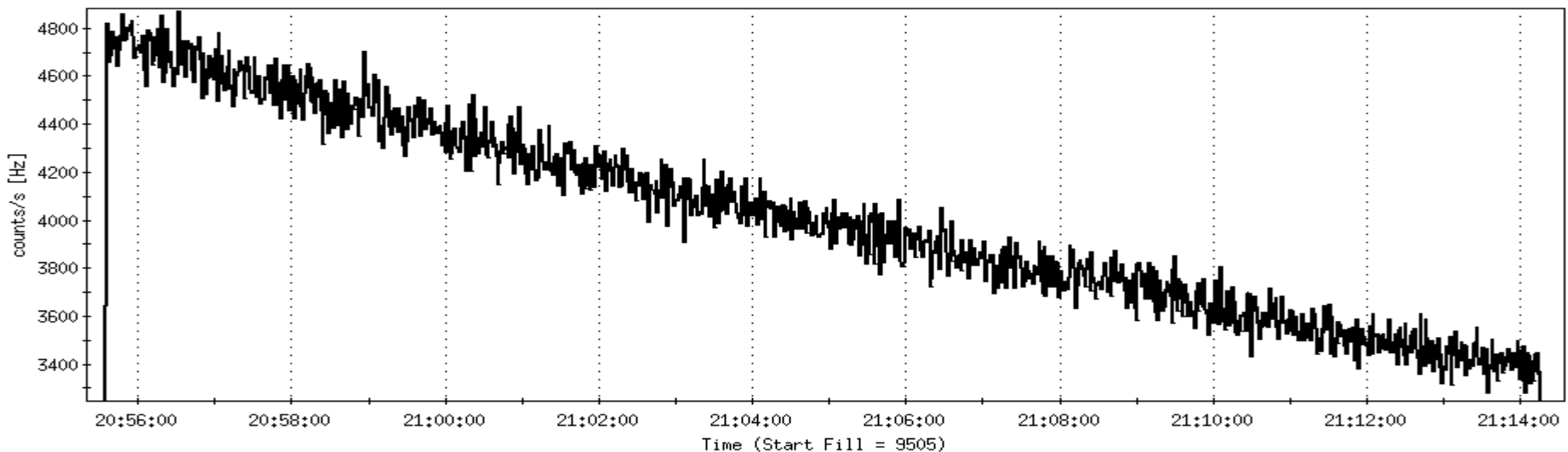
- ➢ Last knobs put in for difference mode were +/-6e-3 m^{-1} in blue IR8 tq4s
- ➢ AC dipole: moved waist closer to center by 15cm horizontal, not vertical
  - ▪ Mei will have some of these results, as might Wolfram

- ➢ bo7/bi8-tq4 power supplies running at about 100A (out of 150A)

- ➢ Next:
  - ▪ These are "primitive" knobs, moving waist, but changing other params
  - ▪ Nikolay has "true" waist knobs (similar to beta* knobs) developed
  - ▪ The ability to move tqs by up to 7e-3 m^{-1} helps another APEX: ORM!

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➢ Last ORM data was taken for dAu80

- Lattice has changed in both rings since then
- Johan Bengtsson and I have been analyzing dAu80 data again
- Johan says "BPM data is excellent"; our convergences to chi^2 of 8 from 400+ with that data set "also excellent"
- This was accomplished by carefully removing selected degeneracies to make the convergence robust

ORM analysis /cfs/ad/satogata/Matlab/at/rhic/2007-12-04-Analysis-Yellow/analysis51.mat, iterations 1-6, 83 parameters

➢ A complete data set for low-beta dAu82 is a high priority

- 4h for both rings, 6-bunch ramp with modest intensities